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**INSTALLATION ASSESSMENT  
OF  
ST. LOUIS ARMY AMMUNITION PLANT**

**REPORT NO. 153**

**DECEMBER 1979**



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**US ARMY  
TOXIC AND HAZARDOUS MATERIALS AGENCY**

**ABERDEEN PROVING GROUND, MARYLAND 21010**

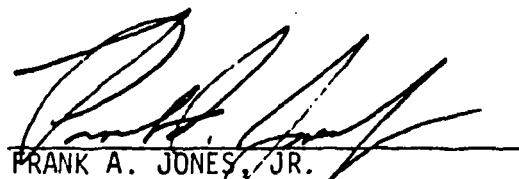
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63120**

INSTALLATION ASSESSMENT  
OF  
ST. LOUIS ARMY AMMUNITION PLANT  
REPORT NO. 153

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#### STATEMENT

"The views, opinions, and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy, or decision, unless so designated by other documentation."

## ABSTRACT

A records search was conducted to assess the environmental quality of St. Louis Army Ammunition Plant (SLAAP) with regard to the use, storage, treatment, and disposal of toxic and hazardous materials and to define any condition which may adversely affect health and welfare or result in environmental degradation.

Operations at the plant were exclusively devoted to the production of metal parts for 105mm projectile casings. All casings were shipped to other Army Ammunition Plants for filling and final assembly. The utilities for the plant operation were provided by the City of St. Louis.

The entire 8.5 hectare area encompassed by the plant is covered with buildings, macadam, or concrete pads.

The records search revealed no indications of contamination from past operations at SLAAP.

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### APPENDIX

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## I. GENERAL

### A. Purpose of the Assessment

To assess the environmental quality of St. Louis Army Ammunition Plant (SLAAP) with regard to the use, storage, treatment, and disposal of toxic and hazardous materials and to define any conditions which may adversely affect health and welfare or result in environmental degradation.

### B. Authority

DARCOM Regulation 10-30, Mission and Major Functions of the US Army Toxic and Hazardous Materials Agency (USATHAMA), 22 May 1979.

### C. Introduction

1. In response to a letter from the Project Manager for Chemical Demilitarization and Installation Restoration (PM CDIR), now USATHAMA, requesting the identification of potentially contaminated installations, the Commander, US Army Armament Materiel Readiness Command (ARRCOM), recommended SLAAP be included in the Installation Restoration Program.

2. Presurvey instructions were forwarded to SLAAP by letter on 20 December 1978 to outline assessment scope, provide guidelines to SLAAP personnel, and obtain information for review by the Records Search Team prior to the onsite search.

3. Personnel were briefed by USATHAMA on the installation Restoration Program prior to the onsite records search.

4. Various government agencies were contacted during the period of 8 January 1979 through 23 March 1979 for documents pertinent to the records search effort. Agencies contacted included:

- a. Department of Defense Explosives Safety Board (DDESB).
- b. US Army Environmental Hygiene Agency (USAEHA).
- c. US Geological Survey (USGS).
- d. US Army Engineer Waterways Experiment Station (WES).
- e. National Technical Information Service (NTIS).
- f. US Army Armament Materiel Readiness Command (ARRCOM).
- g. Chemical Systems Laboratory (CSL).

5. The onsite phase of the records search was conducted from 5 March through 9 March 1979. The following personnel were assigned to the team and prepared the report:

- a. Mr. Norman Leibel, Team Leader, CSL.
- b. Mr. Jerry Cichowicz, General Engineer, CSL.
- c. Mr. Reuben Proper, Chemist, CSL.
- d. SP4 Janice Canterbury, Environmentalist, CSL.
- e. Mr. Harry Woods, Geologist, WES.

6. In addition to the review of records, interviews were conducted with several employees. A ground tour of the installation was also conducted and photographs taken during this tour are included as Appendix A.

7. The findings, conclusions, and recommendations are based on the records made available at the time of the search. Where conspicuous discrepancies existed, attempts were made to determine the validity of information by contacting other sources.

#### D. Brief History

The 8.5 hectares (ha) now comprising SLAAP were originally included in the 111.7 ha area of the St. Louis Ordnance Plant. The Ordnance Plant was the largest small arms ammunition installation in the world and embodied three operating divisions: shell, core, and ammunition.

The existing plant area, a small portion of the Ordnance Plant, was constructed in 1941 for the production of small arms ammunition. With the addition of the Nick and Break Area and the Forge Building in 1944, the present plant was converted from small arms to 105mm projectile production.

After producing 2,500,000 projectiles for the World War II requirement, the plant was placed in "Standby-Under Power Extended Storage Condition" by the Chevrolet Motor Division, General Motors Corporation in September 1945. The St. Louis Ordnance District maintained the plant on a standby basis with civil service personnel until its reactivation on 25 March 1951 by the Chevrolet Motor Division. The contract for production was transferred from the St. Louis Ordnance District to the St. Louis Ordnance Plant in March 1952. Production from 1951 to 1954 totalled 19,094,325 projectiles. Plant operations were terminated as of 1 May 1954. Interim maintenance was performed until 30 August 1954 when a layaway contract was approved. On 31 December 1958, the maintenance contract with General Motors was terminated and maintenance was assumed by the United States Defense Corporation (Olin) and continued until 1966. In September 1966, Chevrolet Motor Division started reactivation and took over the complete operation. The first production was accepted in November 1966. When operations were terminated in December 1969, 23,878,646 projectiles had been produced. Layaway operations were started immediately and were completed by April 1970. General Motors continued maintenance of the plant until February 1972.

On 1 March 1972, Donovan Construction Company of Minneapolis, Minnesota, was awarded a contract for the maintenance and surveillance of SLAAP. In addition to the maintenance and surveillance contract, a companion facilities contract was executed on the same date. These contracts have been renewed annually since that time. The facilities contract was used as an instrument to procure 94 major pieces of production equipment. The equipment is stored at SLAAP pending a decision by the Department of the Army as to whether this plant should be modernized or if a new facility should be built elsewhere.

Donovan Construction Company subcontracted the maintenance and surveillance of this installation to Plant Facilities and Engineering, Incorporated, from inception; the subcontractor continues to provide this service at the present time.<sup>1</sup>

#### E. Leases

1. There are no active leases at SLAAP.
2. SLAAP leases 11,858 square meters of property from the State of Missouri to be used as a parking lot in the event of mobilization.
3. There have never been any active grazing or agricultural leases at SLAAP.

#### F. Legal Actions

There are presently no legal actions pending against SLAAP and neither available records nor personnel interviewed revealed that there had ever been any legal suits resulting from production contamination.

## II. ENVIRONMENTAL SETTING

### A. Meteorological Data

SLAAP is located just within the city limits of northern St. Louis, Missouri. The climate of St. Louis has been defined as "humid continental" and is characterized by four distinct seasons. Summers are warm and extended periods of extremely hot temperatures are rare; temperatures of  $>32^{\circ}\text{C}$  occur 35 to 40 days a year, usually during July and August. Spring and autumn are generally moderate. Winters are brisk without extended periods of bitter cold: temperatures of  $<0^{\circ}\text{C}$  occur less than 25 days per year; readings below  $-17^{\circ}\text{C}$  occur rarely. The average mean temperature is  $14^{\circ}\text{C}$ . The annual average precipitation is 93 centimeters (cm) and is well distributed throughout the year. Occasionally there are high winds and flooding in the St. Louis area.<sup>1</sup> Due to its relative distance from the Mississippi River, flooding should not present any problem at SLAAP.

### B. Geological Setting

#### 1. Physiography/Topography/Drainage

SLAAP lies within the corporate limits of the City of St. Louis, St. Louis County, Missouri, as shown in Figure 1. St. Louis County is situated in the southern portion of the Dissected Till Plains Section of the Central Lowland Province as shown in Figure 2. The topography of the eastern two-thirds of St. Louis County consists of rolling uplands with slopes between 2 to 5% at elevations up to 168 meters (m) mean sea level. Local relief seldom exceeds 30 m. The drainage within St. Louis County terminates in the Missouri River on the north, the Mississippi River to the east, and the Meramec River to the south.

#### 2. Geology

##### a. Surface

St. Louis County lies at the southern extremity of the glacier activity with only a few patches of soil having been tentatively classified as glacial material. Almost all of the surface formations in St. Louis County consist of extensive deposits of windblown silt (loess) derived from the flood plain of the Missouri River during the Pleistocene (glacial) Age. The deepest loess, more than 15 m thick, is found along the bluffs of the Missouri River. In general, these deposits narrow to the south and are seldom more than 1.5 to 3 m deep along the ridgetops in the southwestern part of the county. Loess deposits on the adjacent hillsides have generally been removed or reworked by surface water.

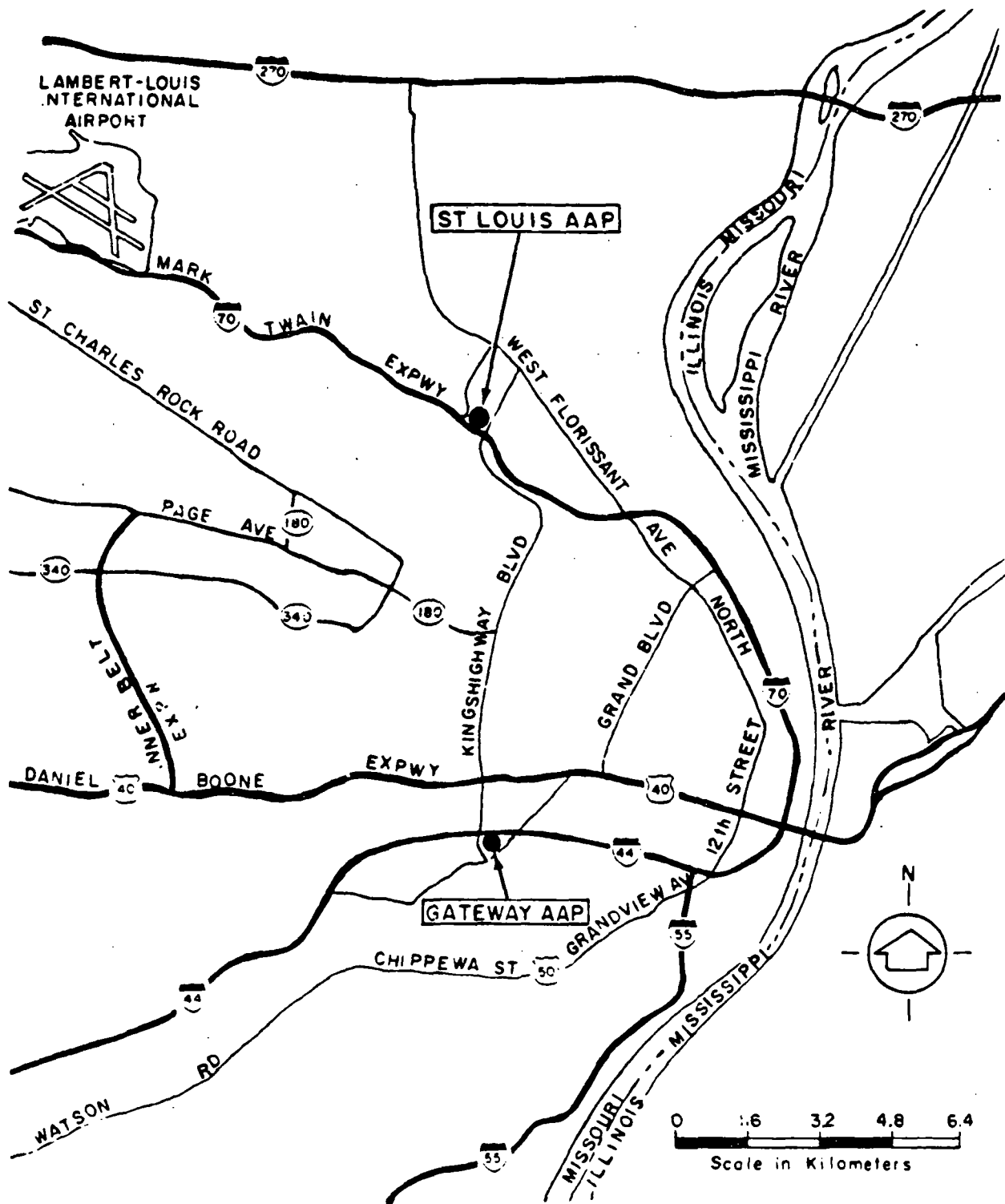


Figure 1. Location Map, St. Louis Army Ammunition Plant

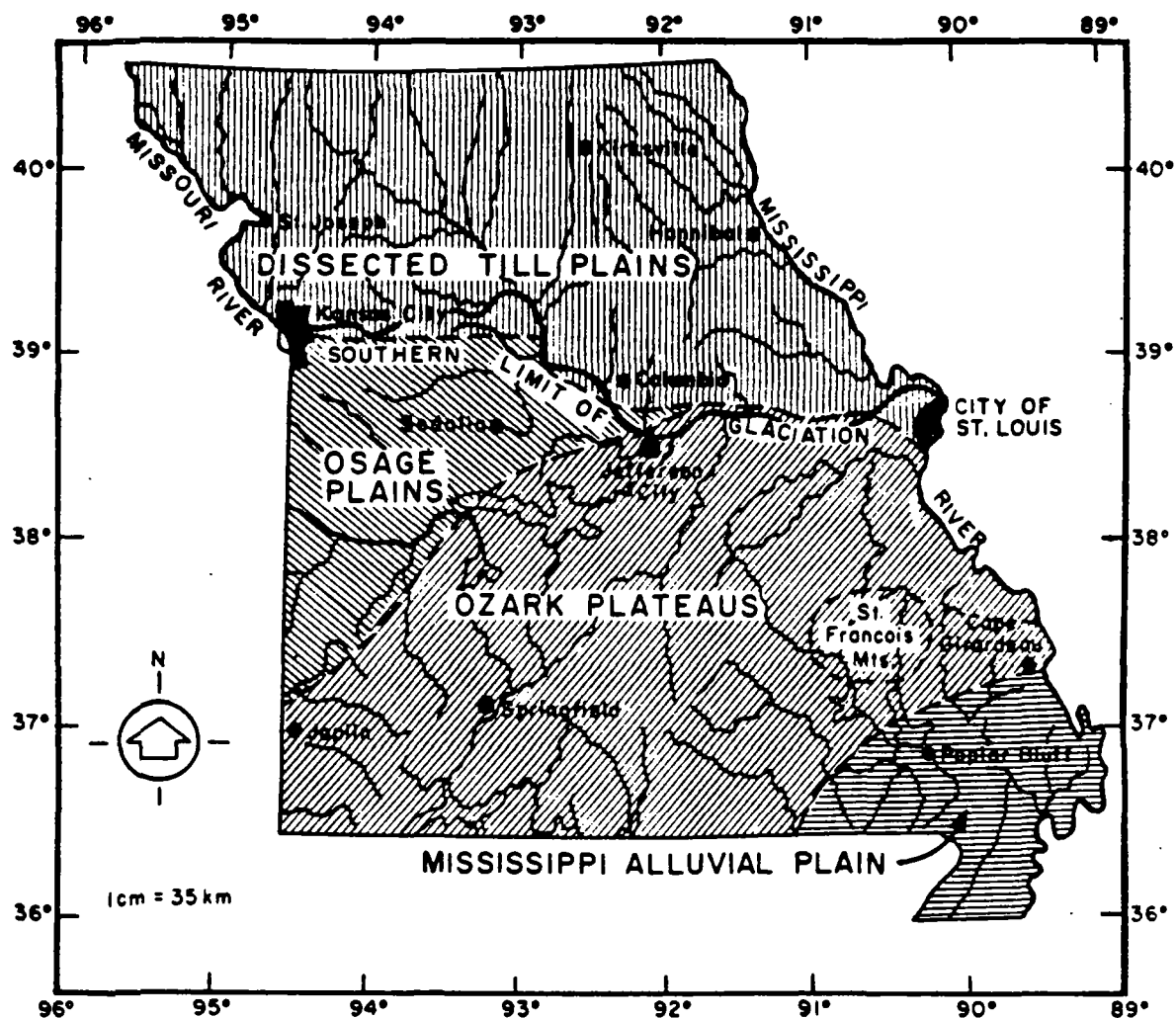


Figure 2. Physiographic Provinces of Missouri

### b. Subsurface

The bedrock geology in St. Louis County consists of essentially flat-lying sedimentary formations, mostly limestone and dolomite. A slight regional northeast dip has been modified by several minor northwest-southeast trending folds or flexures. A soil test boring drilled in 1971 at SLAAP encountered medium hard, light gray, medium- to fine-grain limestone at 19.8 m; this is apparently the Ste. Genevieve limestone of the Mississippi Age and is overlain by 13 m of medium hard, light yellow to gray, sandy clay shale to shale which is possibly of the lower Pennsylvania Age. The above formations are listed in Table I which also includes a generalized stratigraphic column for St. Louis, St. Charles, and Jefferson Counties, Missouri. The soil test boring log is presented in Appendix B.

All bedrock units in and around St. Louis are capable of yielding varying amounts of water to wells. Yields of wells are dependent, of course, on such factors as depth, length, and diameter of the open hole; formations penetrated; geographic location; structural attitude of the rock; and permeability of the aquifers tapped. Most wells in the St. Louis area yield a maximum of 189 liters per minute (l/min) from depths down to 244 m. Water yields of up to 7,520 l/min can be expected from wells drilled in thick alluvial deposits and contain little silt or clay-sized material.

Some water-bearing characteristics of the subsurface units in the St. Louis area are presented in Table I; the more important zones are identified by an asterisk.

### 3. Soil

SLAAP is almost entirely covered with buildings and/or parking lots. The remaining areas have been reworked during construction, whereby the original surface soil has lost its true identity.

The subsurface soil extends down to a depth of approximately 8 m as determined from the soil test boring at SLAAP. This material is a medium stiff, light gray to brown silt to clayey silt. Rust stains and small roots were encountered at 6 m. Weathered shaley limestone underlies the subsurface soil.

### c. Biota

SLAAP is located within the industrial/residential area of St. Louis. The plant area is largely covered by buildings, roads, parking lots, and other man-made structures; furthermore, SLAAP encompasses no bodies of water. Thus, very limited plant and animal life exists in or near the vicinity of the plant.

The birds, fish, mammals, and plants found in the St. Louis area are included in Appendix C.

TABLE 1  
GENERALIZED STRATIGRAPHIC COLUMN FOR ST. LOUIS,  
ST. CHARLES, AND JEFFERSON COUNTIES, MISSOURI

System	Series	Group	Formation	Aquifer Group	Thickness (Feet)	Dominant Lithology	Water-bearing Character
Quaternary	Holocene		Alluvium <sup>1/</sup> *		0-46	Sand, gravel, and clay.	Some wells yield more than 7,570 l/min.
	Pleistocene		Loess Glacial till		0-34 0-17	Silt Pebbly clay and silt.	Essentially not water yielding.
Pennsylvanian	Missourian	Pleasanton	Undifferentiated		0-23	Shales, siltstones.	Generally yields very small quantities of water to wells. Yields range from 0 to 38 l/min.
		Marion	Undifferentiated		0-27	"dirty" sandstones.	
	Desmoinesian	Cherokee	Undifferentiated		0-61	coal beds and thin limestone beds.	
	Atokan		Undifferentiated				
Mississippian	Meramecian		Ste. Genevieve Formation	1	0-49	Argillaceous to arenaceous limestone.	Yields small to moderate quantities of water to wells. Yields range from 19 to 190 l/min. Higher yields are reported for this interval locally.
			St. Louis Limestone*		0-55		
			Salem Formation*		0-58		
			Warsaw Formation*		0-34		
	Osagian		Burlington-Keokuk Limestone		0-75	Cherty limestone.	
			Fern Glen Formation		0-32	Red limestone and shale.	
		Chouteau	Undifferentiated		0-37	Limestone, dolomitic limestone, shale, and siltstone.	
Devonian	Upper	Sulphur Springs	Bushberg Sandstone		0-18	Limestone and sandstone.	
			Glen Park Limestone Grassy Creek Shale		0-15	Fissile, carbonaceous shale.*	
Silurian			Undifferentiated		0-61	Cherty limestone.	
Ordovician			Mequoketa Shale		0-50	Silty, calcareous or dolomitic shale.	Probably constitutes a confining influence on water movement.
		Cincinnatian	Cape Limestone		0-2	Argillaceous limestone.	
	Champlainian		Kimswick Formation*	2	0-44	Massive limestone.	Yields small to moderate quantities of water to wells. Yields range from 11 to 89 l/min. Decorah Formation probably acts as a confining bed locally.
			Decorah Formation		0-15	Shale with interbedded limestone.	
			Plattin Formation		0-73	Finely crystalline limestone.	
			Rock Levee Formation		0-28	Dolomite and limestone, some shale.	
			Joachim Dolomite*		0-41	Primarily argillaceous dolomite.	
			St. Peter Sandstone*		0-49		
			Everton Formation*	3	0-40	Silty sandstone, cherty limestone grading upward into quartzose sandstone.	Yields moderate quantities of water to wells. Yields range from 38 to 510 l/min.
	Canadian		Powell Dolomite*	4	0-46	Sandy and cherty dolomites and sandstone.	Yields small to large quantities of water to wells. Yields range from 38 to 1,136 l/min. Upper part of aquifer group yields only small amounts of water to wells.
			Cotter Dolomite		0-98		
			Jefferson City Dolomite		0-69		
			Roubidoux Formation*		0-54		
			Gasconade Dolomite* Crater Sandstone Member		0-85		
Cambrian	Upper	Elvins	Eminence Dolomite*	5	0-52	Cherty dolomite, siltstones, sandstone and shale.	Yields moderate to large quantities of water to wells. Yields range from 38 to 1,514 l/min.
			Potosi Dolomite*		0-99		
			Derby-Doerun Dolomite		0-50		
			Devis Formation		0-46		
			Bonne Terre Formation		75-117		
			Lamotte Sandstone*		72*		
Precambrian						Igneous and metamorphic rocks	Does not yield water to wells in this area.

<sup>1/</sup> Basal part may be of Pleistocene Age.

NOTE. Stratigraphic nomenclature may not necessarily be that of the U.S. Geological Survey.

\* Water-bearing formations.

### III. DISCUSSION

#### A. Potential Contamination

##### 1. Installation Operations

##### a. Industrial Operations

3. Building numbers are keyed to the General Site Map, Figure

The primary mission of SLAAP was the production of 105mm projectile casings.\* The projectiles were shipped to other Army ammunition plants for explosive filling and final assembly. Over 41,000,000 projectiles were produced from 1944 through 1970.<sup>3</sup> During the last production runs at SLAAP, the production rate reached 600,000 per month. In the event of mobilization, production capability is planned at 800,000 per month.

A support function of SLAAP involved the production of acetylene gas from calcium carbide. The gas was produced and stored in Building 9 which is located in the southwest corner of the plant.<sup>4</sup> The acetylene was used to score (nick) the steel billets prior to the break operation.

Projectile manufacturing operations began in Building 1. Long steel billets were cut into prescribed lengths using a nick and break method; hydraulic systems were employed during the break operation. Spray and quench operations were also performed in this building for cooling. All solid wastes and some liquid wastes were removed from SLAAP by a local contractor. Wash down type liquid wastes were pumped directly into the sewage system.<sup>4</sup> The plant discharge was monitored periodically by the St. Louis sewer authority and discharges were in compliance with city ordinances.<sup>4,5</sup>

Building 2 was the Forge Building which contained ten rotary gas and oil fired furnaces for slug heating/forging. Spray and quench operations were performed in this building for cooling. Various hydraulic systems were used.

Two floors in Building 3 were utilized for machining operations. The building contained various lathe operations, hydraulic presses, conveyors, air driven machinery for cutting, shaping, and finishing of metal, quenching and metal treating processes, rust proofing processes, painting, and stripping and metal preservative operations.<sup>3,4</sup> Welding equipment, machine shops, electrical and carpenter shops, and a small automotive shop are also housed in this building.<sup>6</sup>

\*Hereafter, all reference to projectile casings will be referred to only as projectiles.

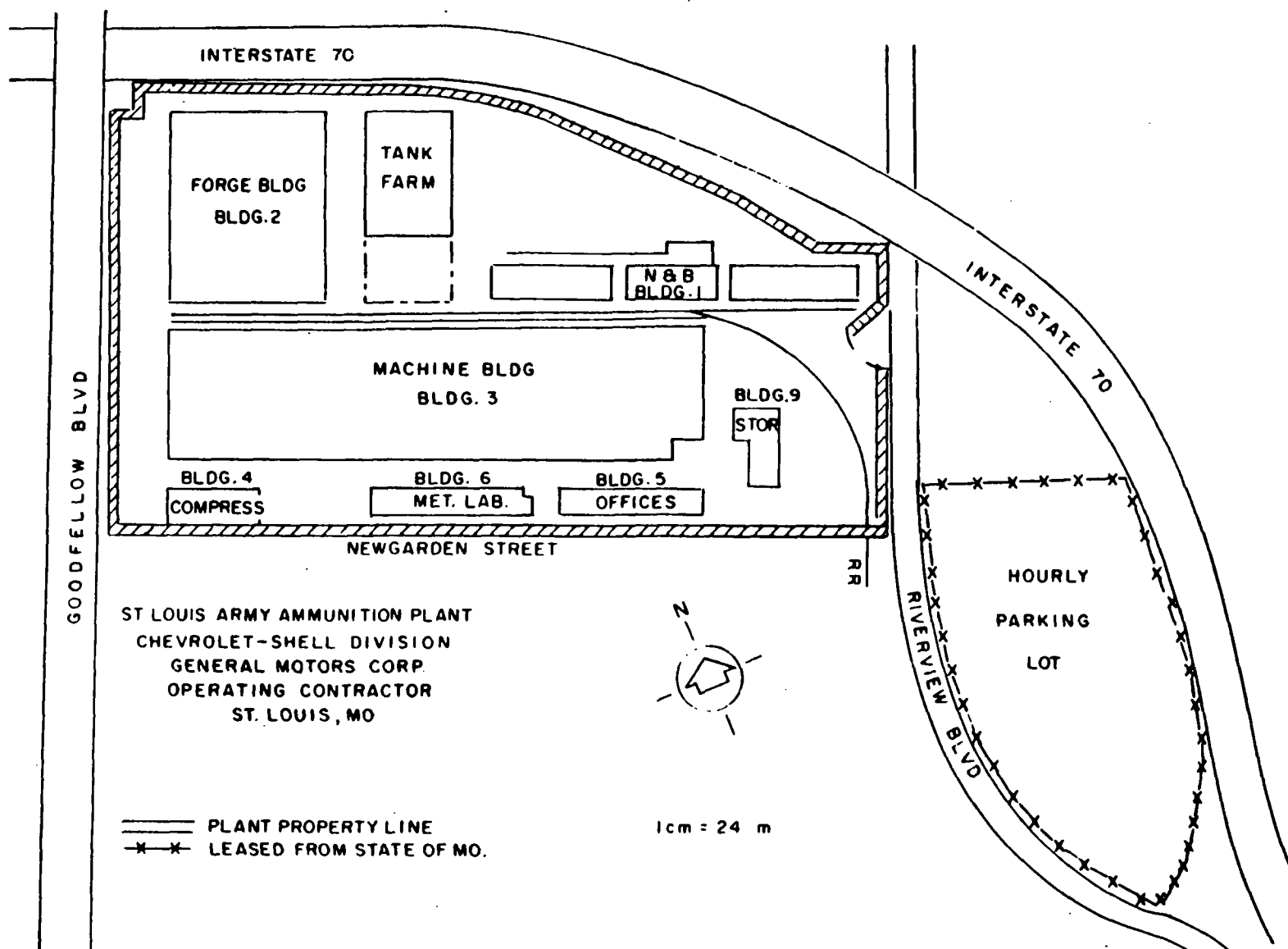


Figure 3. General Site Map of St. Louis Army Ammunition Plant

A self-contained liquid storage area is located on the first floor of this building. It was used to store drums of processing chemicals, oil, and greases as shown in Tables II and III. An area to the front of Building 3 houses the administrative offices.

Building 4 is the Compressor Building.

Building 5 was used for contractor office space. It was also leased during 1962 and 1967 to the Futura Manufacturing Company for the assembly of small radios.

The metallurgy laboratory was located in Building 6. This building was also leased to the Futura Manufacturing Company during the 1960's.

Building 9 was used for the production of acetylene gas.

A tank farm is located between Buildings 1 and 2 and contains nine oil tanks to fuel the furnaces in the Forge Building (2). Each tank has a capacity of 19,000 liters.

b. Lessee Industrial Operations

Futura Manufacturing Company leased Buildings 5 and 6 (excluding the laboratory area on the first floor) during the period from 1 January 1962 to 1 January 1967 for the assembly of small pocket-sized radios. These types of operations did not result in the contamination of the plant area.<sup>4</sup>

Industrial discharge produced by lessee operations was directed to the common (storm and sanitary) sewage systems. Solid waste was hauled away from SLAAP by subcontractors.<sup>4</sup>

c. Laboratory Operations

A metallurgical laboratory was located on the first floor of Building 6 during all the production years. The laboratory performed quality control and the operations performed included: polishing, measuring, some etching, and utilizing small amounts of chemicals and/or solvents. Liquid waste was flushed into the common storm and sanitary sewage system.<sup>4</sup>

d. Proof and Surveillance Testing

Since the casings produced at SLAAP were not finished products, proof and surveillance testing was never conducted at the plant. Metallurgical inspection was the only type of quality assurance performed on the 105mm projectiles.<sup>4</sup>

TABLE II

ST. LOUIS ARMY AMMUNITION PLANT

OIL AND GREASE USAGE LIST (January 16, 1969)

	<u>Type</u>
MR 186 - Hot Forging Compound	Shell Rotella #30
Molyshield Grease - Alubo	Automatic Transmission Fluid
MX-2 Hi-Temp Grease	Roller Rythem
Coollex #25 Coolant	M53 Rust
GM-3 Cold Hosing Compound	Shell Alvania Grease
Spindle Oil	Hydraulic Oil G.M. Spec. 16A
Shell Carnea 31 Machine Oil	Shell Macoma 6 Oil
G. M. Spec. 4546M	Mobil DTE 105 Oil
Mobilplex EP #1 Grease	Mobil Extra Heavy Oil
Texaco Soluble "D" Oil	Regal GRO Spindle Oil
Cimperial 20	Ecnogrind
Fibrax Grease #370	
Shell Rotella #20	

TABLE III

## ST. LOUIS ARMY AMMUNITION PLANT: PROCESS FLUID USAGE\*

<u>Fluid</u>	<u>Volume (liters)</u>
Thinner (Toluol)	45,000
Enamel TT-E-516	159,000
Primer MIL-P-22332A	36,000
Corrosion Preventive Compound (Phosphoric acid)	2,500

\*For rate of 600,000 projectiles/month during final 105mm projectile production run (1969).

e. Training Areas

Although there are no troop training areas at SLAAP, in-service training programs have been conducted which were job and safety related.

f. Chemical/Biological/Radiological Activities

There have never been any chemical/biological agents or radioactive materials manufactured, stored, or tested at SLAAP.<sup>3</sup>

g. Storage of Toxic/Hazardous Materials

The only toxic or hazardous items used and stored at SLAAP were: thinners (toluol), enamels, primers, corrosion preventive compounds (phosphoric acid), forging compounds, machinery coolants, transmission fluids, hydraulic oil, and various types of machinery oil and greases. Table II is a complete listing of greases and oils presently used and stored at SLAAP. Table III is a list of chemicals and paints used in the plant operations. These petroleum products and industrial chemicals were stored in a secured area within Building 3.

h. Pesticide/Herbicide/Fertilizer Usage

The pest control program has been contracted to a commercial agency in the St. Louis area.

Pesticide usage has included Rid-a-Bird\* with the active ingredient Fenthion, and Avitrol which contains 4-aminopyridine. Avitrol is also used in grain form as a bait. Both chemicals are EPA approved and are not considered to be persistent.

Malathion is occasionally used for termite control. The herbicide 2,4,5-T Ester is used at SLAAP to control brush and weeds.<sup>1</sup> There are no records to indicate the past storage of pesticides, herbicides, or insecticides at SLAAP.

2. Disposal Operations

a. Sewage Treatment

All industrial and sanitary waste generated at SLAAP is discharged into the St. Louis municipal sewer system. The waste discharge

\*The use of trade names in this report does not constitute an official endorsement or approval of such commercial products. This report may not be cited for purposes of advertisement.

was monitored periodically by the St. Louis sewer authority and discharges were in compliance with city ordinances. The city sewage is treated at the St. Louis treatment facility.

b. Burials

There are no burial sites located at SLAAP. All trash and wastes are collected and hauled away by a local contractor.

c. Holding and Settling Ponds

There have never been any holding and/or settling ponds or waste lagoons; however, collection sumps were present in the manufacturing areas. The sumps were cleaned out periodically and the sludge was hauled from the plant by a local contractor. Table IV is a typical listing of production waste which was removed from SLAAP. This is based on a production rate of 600,000 projectiles (105mm) per month.

d. Demolition and Burning Ground Areas

There have never been any demolition or burning ground areas on this installation.

e. Demilitarization

Demilitarization is not applicable to SLAAP activities.

f. Miscellaneous

No records indicated large spills of industrial chemicals or petroleum products. There was evidence, however, of minor spills at the fuel oil tank farm which resulted from leaking pipe joints and opening and closing of system valves. Although collection areas have been provided under the tanks in the event of serious leaks, these areas are not lined. The small quantity of oil from leaky pipe joints is not considered a significant contamination problem.

B. Water Quality

SLAAP has always purchased its water from the St. Louis, Missouri, water system. The water source is used for all plant operations.

C. Migration Potential

The substratum soil of SLAAP consists of 4.5 to 7.6 m of silt and a clayey silt. No permeability values are available on these soils; however, it can be assumed that vertical migration of liquids would be rather slow.

TABLE IV  
ST. LOUIS ARMY AMMUNITION PLANT: WASTE DISPOSAL\*

CLASSIFICATION	METRIC TONS PER YEAR	METHOD OF DISPOSAL		HAULED BY:
		ONSITE	OFFSITE LANDFILL	
1. Garbage	816	-----	100%	A-1 Hauling
2. Cardboard	544	-----	100%	A-1 Hauling
3. Paper, Cloth, Grass, Etc.	544	-----	100%	A-1 Hauling
4. Wood	181	-----	100%	A-1 Hauling
5. Rubber	N/A	-----	-----	-----
6. Plastics	N/A	-----	-----	-----
7. Oils	3,537	-----	100%	A-1 Hauling
8. Flammable Liquids	1	-----	100%	A-1 Hauling
9. Residues & Tars	181	-----	100%	A-1 Hauling
10. Wastewater Treat Sludges	N/A	-----	-----	-----
(a) Oily	N/A	-----	-----	-----
(b) Lime Bearing	N/A	-----	-----	-----
(c) Metallic Hydroxide	N/A	-----	-----	-----
11. Inert Solids	64	-----	100%	A-1 Hauling
12. Cans, Bands, Wire, Etc.	9	-----	100%	A-1 Hauling
13. Special Wastes	N/A	-----	-----	-----

\*For rate of 600,000 projectiles/month during the final 105mm projectile production run (1969).

The underlying limestone is susceptible to the formation of a karst (solution channels and cavities) once surface water reaches the limestone. Since most of the surface area of SLAAP is covered and all surface runoff and industrial liquids were controlled, the available contamination for offpost migration was held to a minimum.

SLAAP has been inactive for several years in terms of production and all sumps and industrial drains have been cleaned and flushed.

#### IV. FINDINGS

A. There are no current industrial operations at SLAAP; the last projectile production operation was conducted in 1969.

B. According to available records there has never been:

1. Any burning sites, sanitary landfills, burial sites, or holding ponds at SLAAP.

2. Any proof and surveillance testing conducted at SLAAP.

3. Any troop training areas.

4. Any chemical or biological agents or radiological materials manufactured, stored, or tested at SLAAP.

C. During World War II and the Korean and Vietnam Conflicts, only industrial chemicals and lubricants were used or stored at SLAAP.

D. Based on available records, SLAAP water supply and sewage treatment have always been provided by the St. Louis Metropolitan Area.

E. Surface drainage and sanitary wastes have been and are presently directed into a common sewer system.

F. During plant operation, contaminated liquid and solid industrial wastes were collected in sumps and holding tanks and removed from the plant area by a private contractor.

G. There are no legal actions pending against SLAAP. Available records did not indicate any legal actions from past plant operations.

V. CONCLUSIONS

- A. SLAAP is not contaminated with residual waste from past operations.
- B. There is no evidence of past or present contaminant migration.

## **VI. RECOMMENDATIONS**

**No preliminary survey be conducted by USATHAMA at this time.**

## REFERENCES

1. DARCOM Installations and Activity Brochure, Report Control Symbol DRCIS-102-R1, dated 31 March 1977.
2. Krusekopf, H. H. and Pratapas, D. B., "Soil Survey of St. Louis County, Missouri," U.S. Department of Agriculture, Washington, D.C., 1923.
3. Lutzen, E. E. and Rockway, J. D., Jr., "Engineering Geology of St. Louis County, Missouri," Missouri Geological Survey and Water Resources, EG Report No. 4, Rolla, Missouri, 1971.
4. Miller, D. E., et al., "Water Resources, St. Louis Area, Missouri," Missouri Geological Survey and Water Resources, WR Report No. 30, Rolla, Missouri, 1974.

APPENDIX A  
PHOTOGRAPHS  
OF  
ST. LOUIS ARMY AMMUNITION PLANT

APPENDIX A  
PHOTOGRAPHS  
OF  
ST. LOUIS ARMY AMMUNITION PLANT

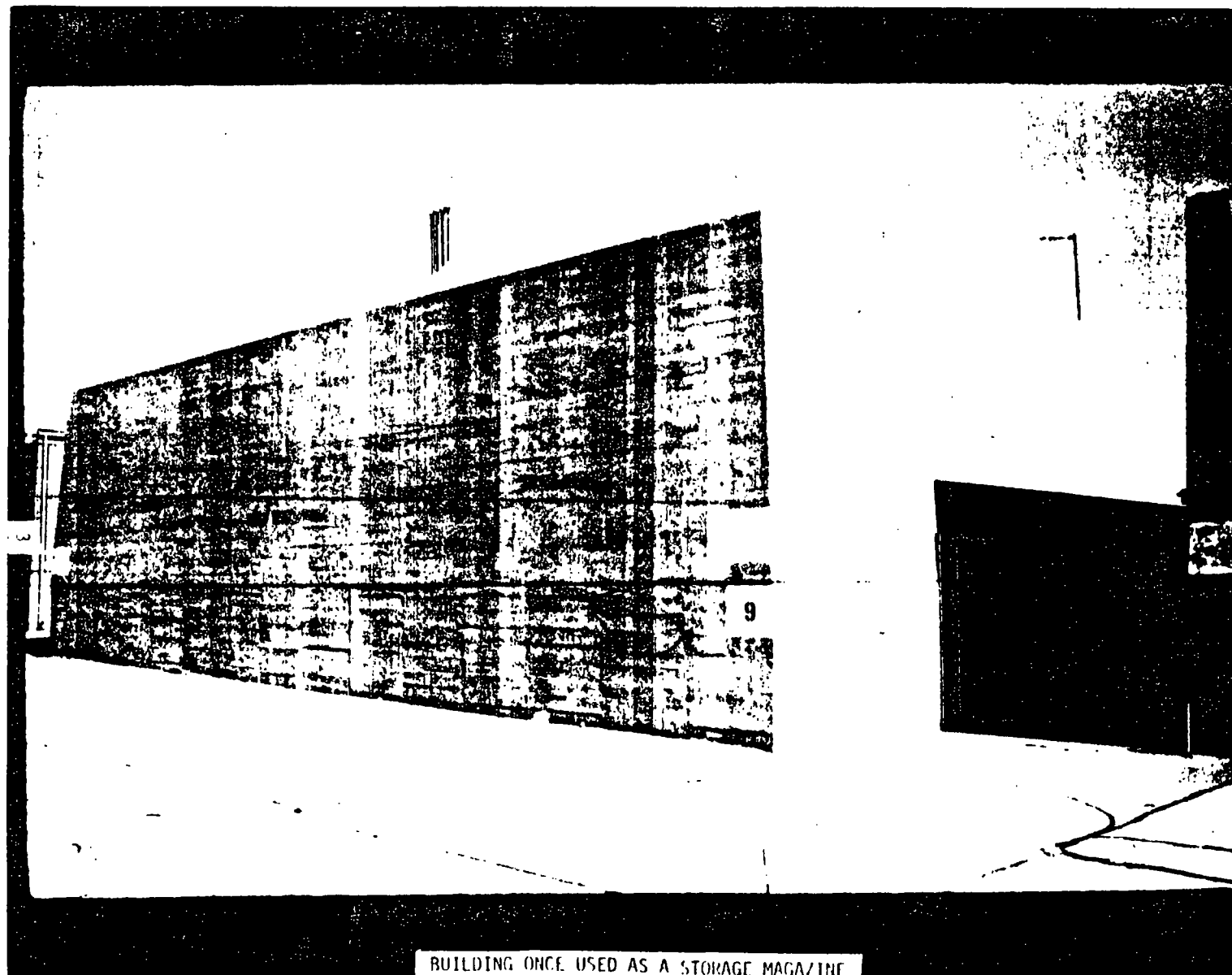


ST. LOUIS

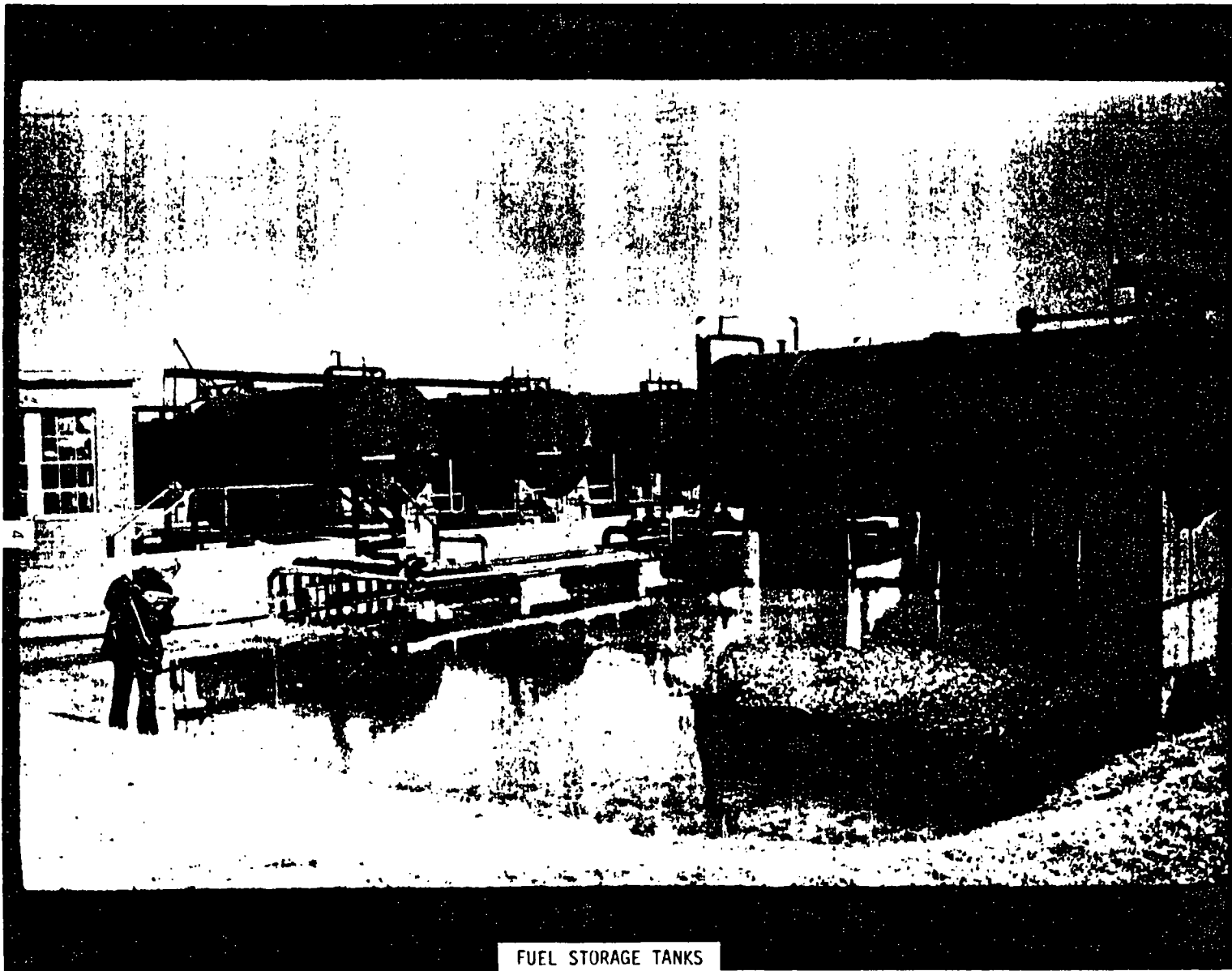
ARMY AMMUNITION PLANT

OPERATING  
CONTRACTOR

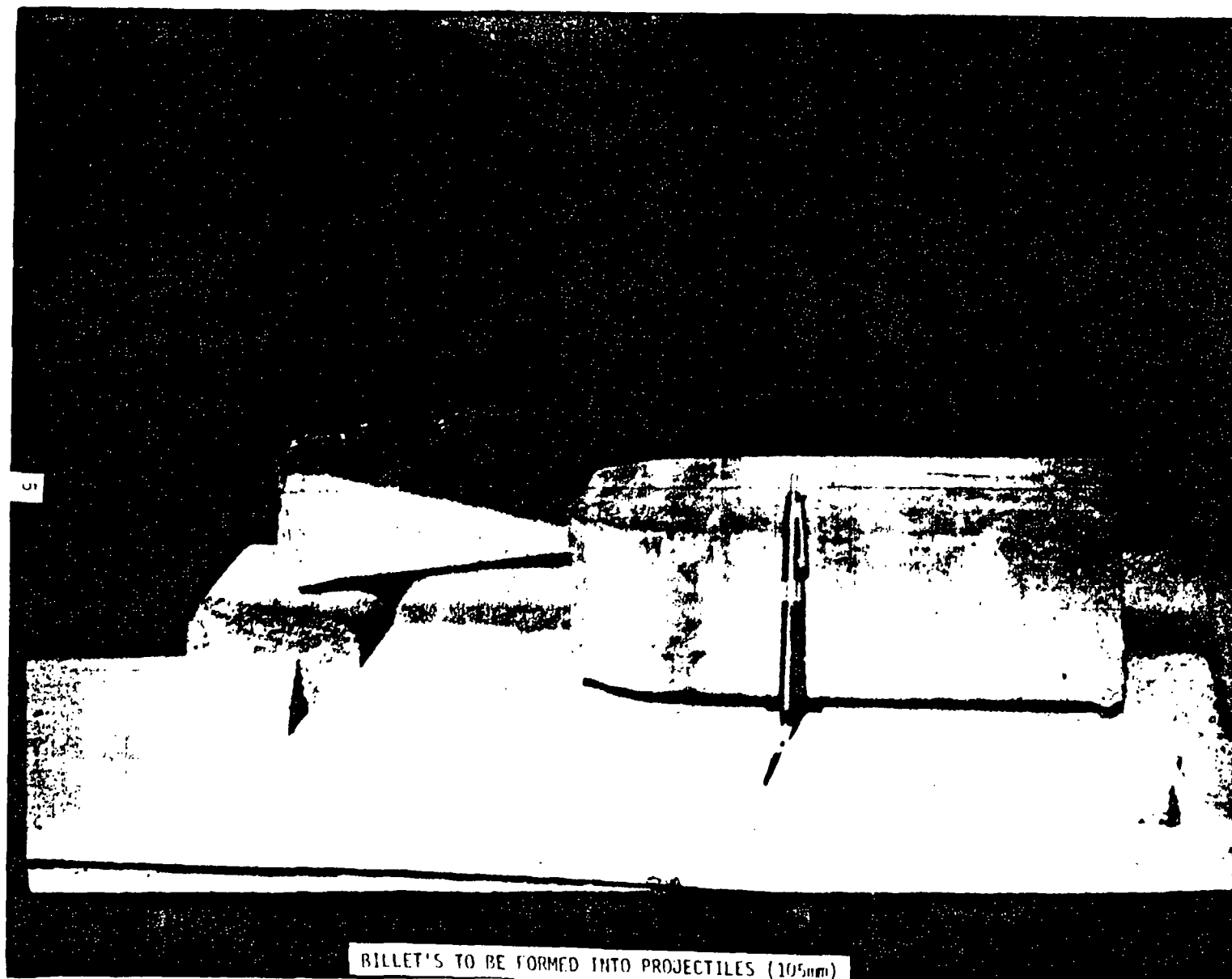
ENTRANCE TO ST. LOUIS ARMY AMMUNITION PLANT



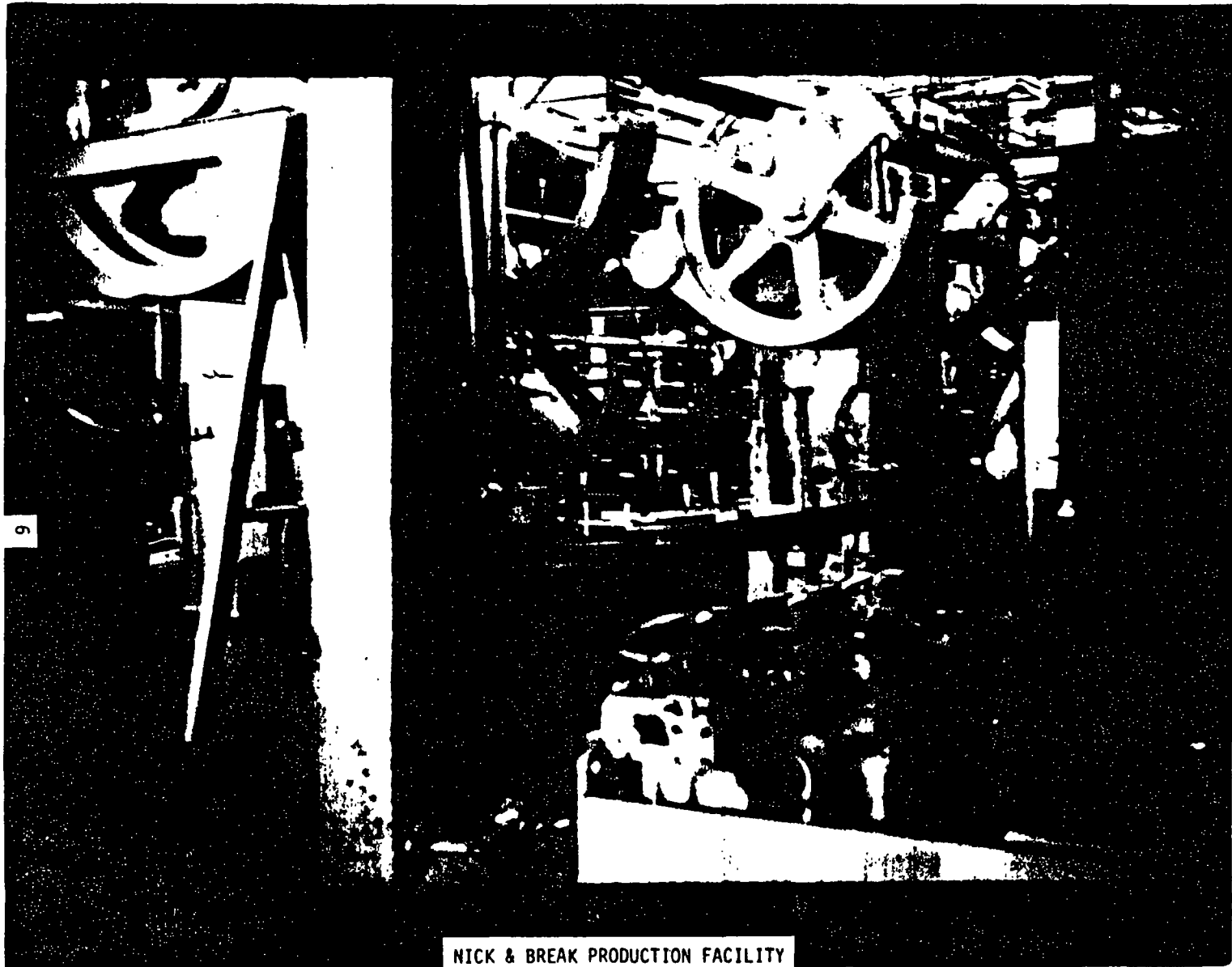
BUILDING ONCE USED AS A STORAGE MAGAZINE



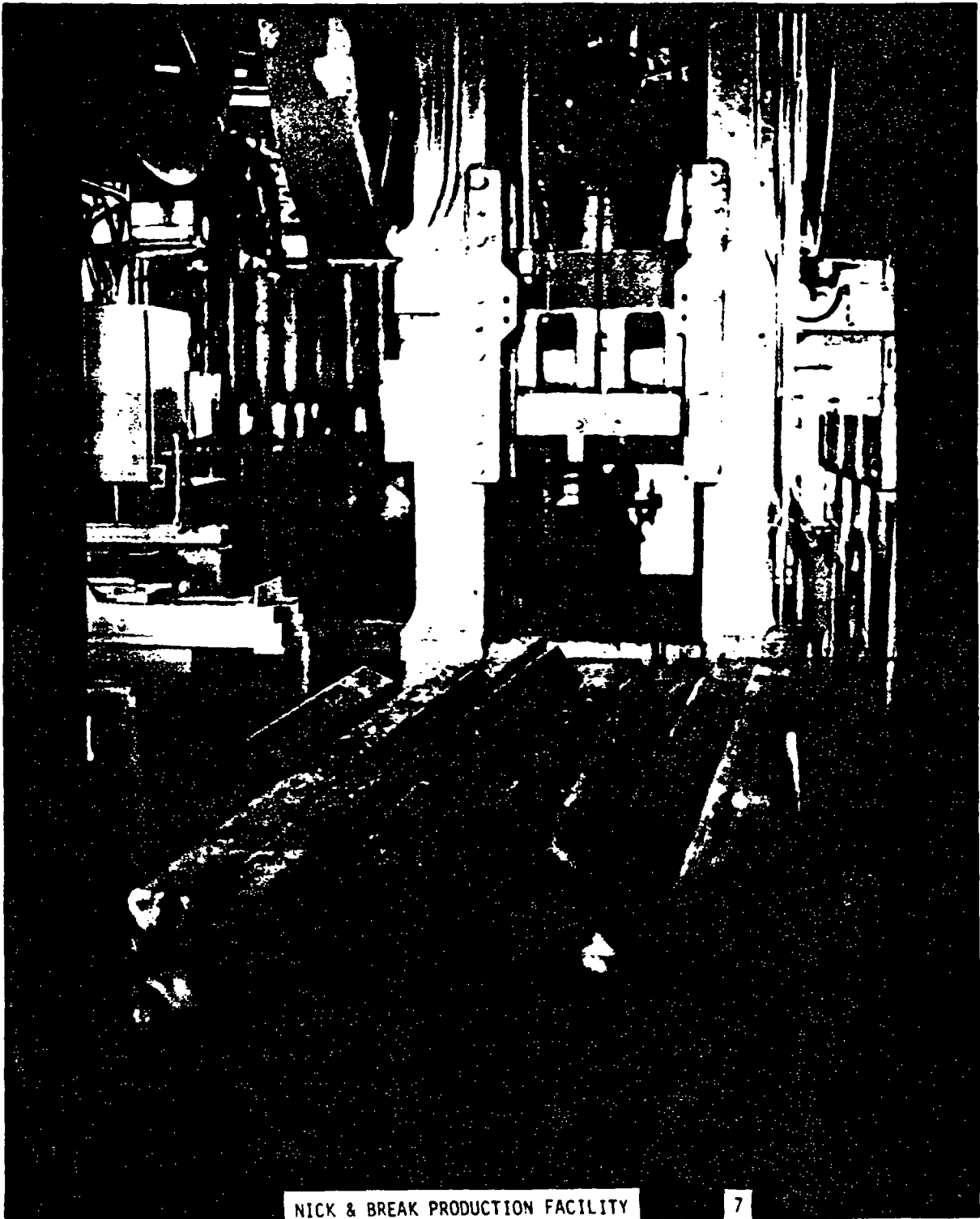
FUEL STORAGE TANKS



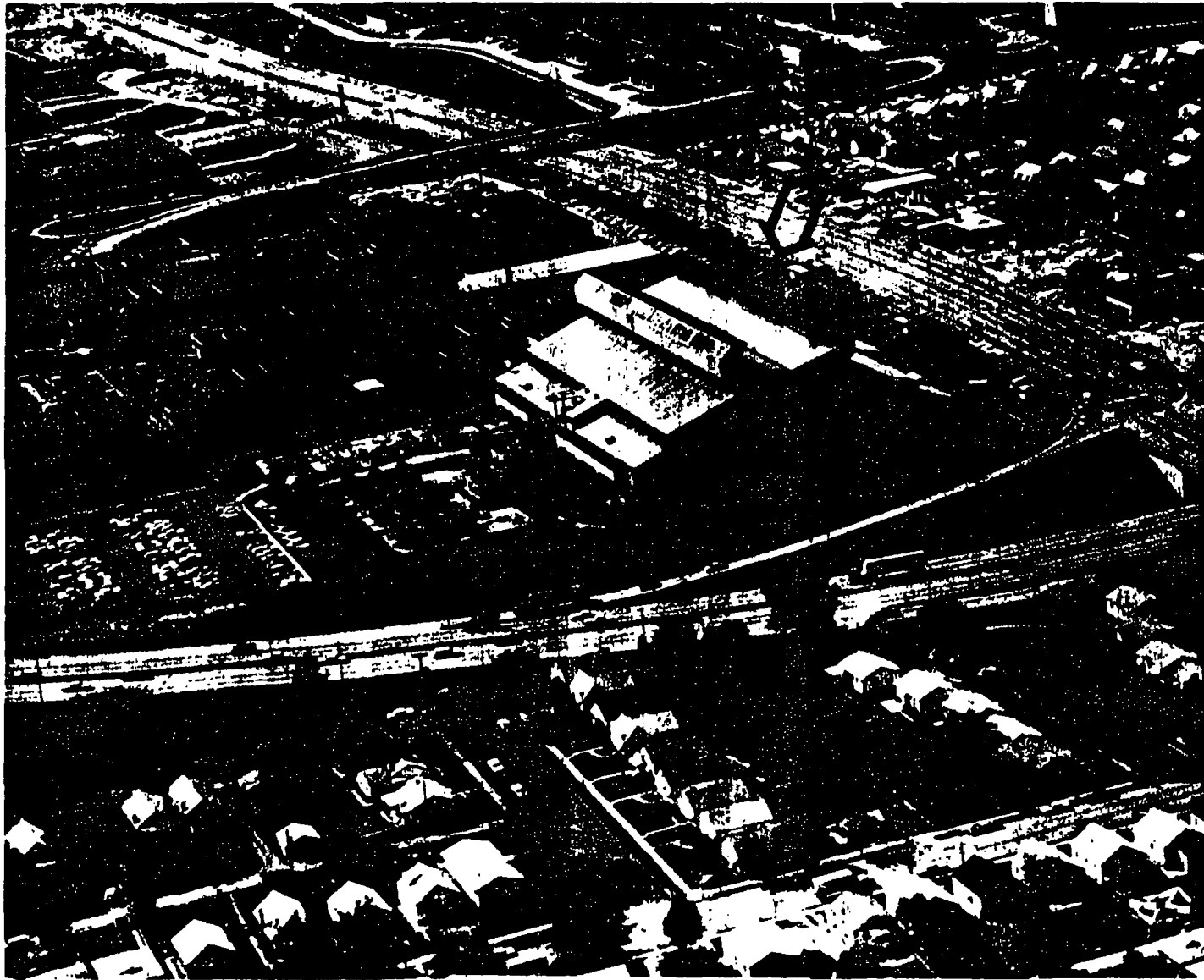
BILLET'S TO BE FORMED INTO PROJECTILES (105mm)



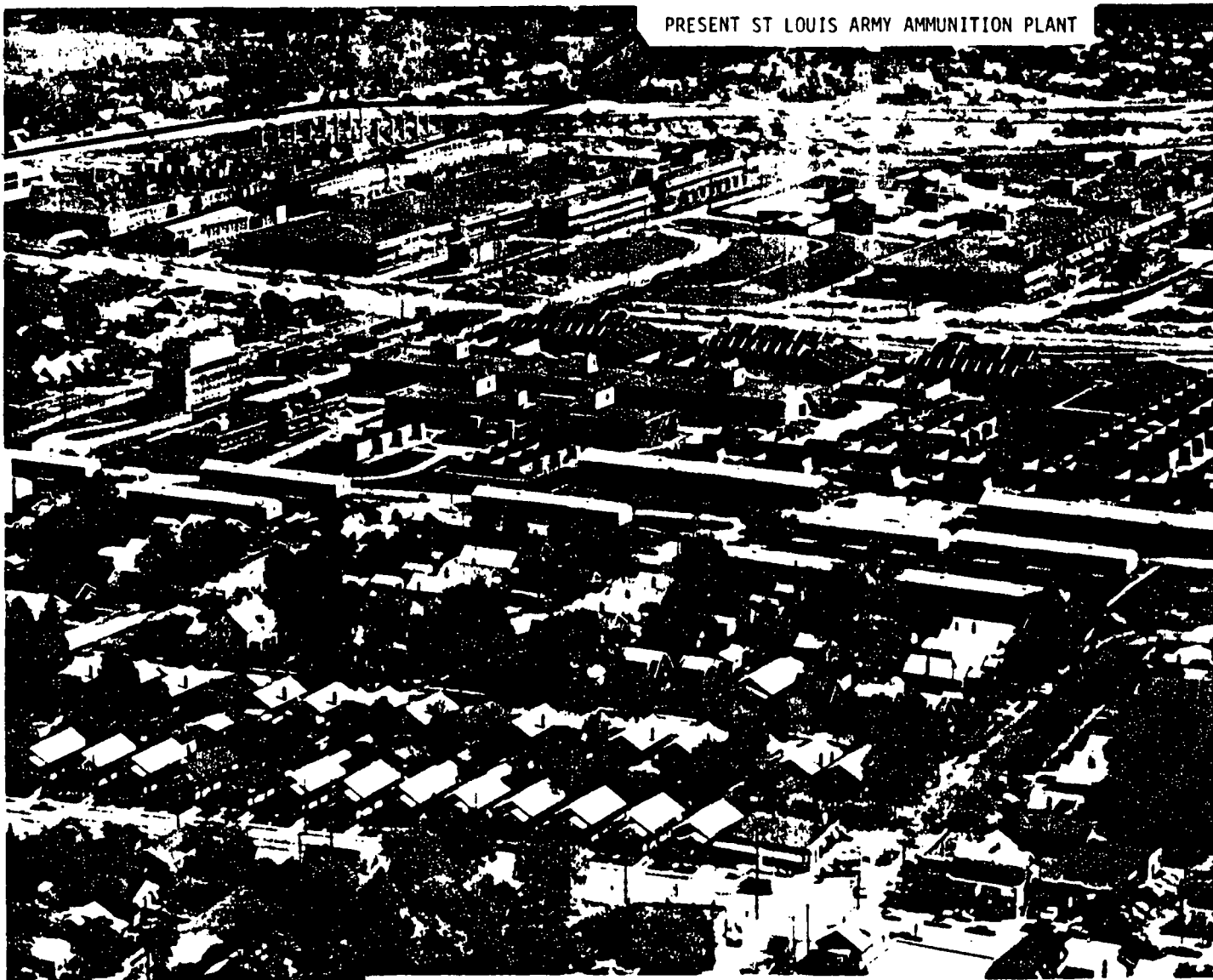
NICK & BREAK PRODUCTION FACILITY



NICK & BREAK PRODUCTION FACILITY



AERIAL VIEW OF FOUNDRY AT SLAAP



PRESENT ST LOUIS ARMY AMMUNITION PLANT

OLD ST. LOUIS ORDNANCE PLANT AND HOUSING AREA

APPENDIX B  
SOIL TEST BORING - ST. LOUIS ARMY AMMUNITION PLANT

## MISSOURI FLORA

Bergemot	Nettle
Bittersweet Family	Orchid Family
Bloodroot	Phlox
Buttercup	Pineweed
Calamint	Plantain
Cinquefoil	Pokeweed
Columbine	Queen Anne's Lace
Crateagus	Rhododendron
Delphinium	Rose Family
Eugenia	Sassafras
Fire pink	Scorpion grass
Fleabane	Selfheal
Geranium	Solomon's seal
Goldenrod	Spring beauty
Joe-pye weed	Sorrel
Lily Family	St.-John's-wort
Mallow Family	Teasel Family
Milkweed	Trillium
Missouri gooseberry	Verbena
Missouri primrose	Violet Family
Mullein	Wild crocus
Nasturtium	

RARE AND ENDANGERED PLANTS OF ST. LOUIS COUNTY

Asclepias meadii  
Aster commutatus  
Boltonia asteroides var. decurrens  
Botrychium dissectum var. dissectum  
Carex douglasii  
Carex gracillima  
Carex praegracilis  
Carex schweinitzii  
Distichlis stricta  
Fontinalis disticha  
Habenoria leucophaea  
Lithospermum latifolium  
Lycopodium lucidulum var. lucidulum  
Malaxis unifolia f. unifolia  
Matelea obliqua  
Matricaria maritima var. agrestis  
Orobanche ludoviciana  
Petandra virginica  
Polygonum bicone  
Prenanthes racemosa  
Spiranthes ovalis  
Stachys hyssopifolia var. ambigua

# 1975-1976 MISSOURI FUR HARVEST

<u>Species</u>	<u>Number Pelts</u>
Raccoon	276,524
Opossum	91,611
Muskrat	89,727
Coyote	14,243
Gray Fox	9,310
Mink	5,863
Red Fox	3,337
Striped Skunk	2,983
Beaver	2,320
Bobcat	911
Badger	127
Spotted Skunk	124
Weasel	58
TOTAL	497,138

## COMMON BIRDS OF ST. LOUIS COUNTY

Baltimore oriole

Blackbirds

    Cowbird

    Red-winged

    Bronzed Grackle

Bluebird

Cardinal

Catbird

Chickadee

Chimney Sweep

Crow

Field Sparrow

Flycatchers

Hérons

    Great blue

    Little green

    American bittern

    American egret

Horned lark

Meadow lark

Mourning dove

Nuthatch

Ovenbird

Phoebe

Purple martin

Rails

    Sora

    Virginia

Red-eyed vireo

Redstart

Robin

Rose brown grosbeak

Sparrow hawk

Tanagers

    Scarlet

    Summer

Titmouse

Towhee

Turkey vulture

Warblers

Whippoorwill

Woodpeckers

    Red-bellied

    Downy

    Hairy

    Flicker

Wood pewee

Wood thrush

Wrens

    House

    Carolina

Yellow dove

Yellow throat

Yellow warbler

## IMPORTANT HOOK AND LINE FISHES IN MISSOURI

### Common Name

Rock Bass  
Goggle-eye, shaddow  
Warmouth Sunfish  
Goggle-eye, redear bass  
Bluegill Sunfish  
Bream, brim, pondperch  
Green Sunfish  
Black perch, goggle-eye  
Longear Sunfish  
Red-belly, bream, tobacco box  
Redhorses (5 kinds)  
Mullet, yellow sucker  
Carp  
German, mirror, leather  
Freshwater Drum  
Sheepshead, stone perch  
croaker, white perch  
Rainbow Trout  
Smallmouth Bass  
Bronzeback, redeye, brownie  
Spotted Bass  
Kentucky bass  
Largemouth Bass  
Line sides, green and black  
White Bass  
Stripped, sand, silver  
Channel Catfish  
Fiddler, spotted, cat  
Blue Catfish  
Fulton, chuckle-head  
Flathead Catfish  
Shovelhead, yellow, mudcat

### Scientific Name

Ambloplites rupertris  
Chaenobryttus coronaris  
Lepomis macrochirus  
Lepomis cyanelus  
Lepomis megalotis  
Genus maxostoma  
Gyprinus carpio  
Aplodinatus grunniens  
Salmo gairdneri  
Micropterus dolomieu  
Micropterus punctulatus  
Micropterus salmoides  
Roccus chrysops  
Ictalurus punctatus  
Ictalurus furcatus  
Pilodictis alivaris

IMPORTANT HOOK AND LINE FISHES IN MISSOURI (Continued)

Common Name

Scientific Name

Bullheads  
Yellow, black, brown

Genus ameiurus

Walleye  
Jack salmon, pike

Stizostedion vitreum

White Crappie  
Calico bass

Pomoxis annularis